IHRA BIOMECHANICS *Final Minutes* San Antonio, November 17 2001

ATTENDEES:

Rolf Eppinger	Chairman/ NHTSA
Dominique Cesari	INRETS/ EU/EEVC
Dainius Dalmotas	Secretary/ Transport Canada
Matt Maltese	NHTSA
Suzanne Tylko	Transport Canada
Quinn Campbell	Conrad Technologies

1. The Chairman welcomed the members and thanked them for their attendance.
2. No formal agenda was presented for this meeting.
3. Copies of the meeting held in Delft in June 2001 were distributed to members but not discussed.

NHTSA presentation of biofidelity methods & data

1. Head drop tests, need to define a time period for HIC calculation
2. Neck tests
   1) Test 1; includes 1 live human
   2) Neck test 2 volunteer (WS Patrick was the subject) data is well specified, possibility of keeping time history but ignoring peaks;
   3) Neck test 3 based on one cadaver; Time histories need to be used for this specification. When they ran the test initially, the body was rigidly strapped. Mr. Maltese suggests that we isolate the head neck from the rest of the dummy, attach the head neck complex to a sled and measure T1 accelerations. This could be used as a component test for neck certification; the flat wall test is still required as a follow up test however because the intensity is not high enough. T1 acceleration of NBDL test needs to be specified.
3. Shoulder pendulum tests
   EEVC 4.3m/s, 23.4 kg; arm down
   Pendulum force only; possibly shoulder deflection
4. Thorax pendulum
   arm up; T1 acceleration and pendulum force
5. Abdomen pendulum
   Pendulum force
6. Pelvis pendulum force and pelvic deflection
7. Sled: Padded wall test
   padding (honeycomb constant stress deflection padding >20 PSI) should have depth increased
   Wall geometry needs to be based on human anthropometry.
   Need to check seat recline angle that it matches UMTRI
   Relying on first three conditions for torso and pelvic test (flat wall, offset,...); deflection(upper & lower thorax, middle abdomen), acceleration (spine T1, T12, struck side ribs). Force

4. General Biofidelity Issues

1. CCV (cadaver cumulative variance)
   Need to look at defining the period of time over which we will evaluate the CCV & DCV, look for max and then cutoff 5ms later displacement time hx, for acceleration trace can use same time period used for displacement. Alternative is to cut off at 20% off the peak
   Need to determine how to combine individual CCC/DCV scores and determine relative importance

2. Determining time ZERO, given specimen variability
   Determine time of original event by body region align signals by min variance over time shift resulting corridor to mean lag post time zero....strategy to be defined for corridor setting.

   Alternative: time zero can be defined by calculating percent of peak time/deflection for each individual response trace, transfer zero point to corresponding acceleration response curve; corridors are based on mean calculated time zero.

3. Mr. Cesari would like to reproduce the CCV/data analysis on his archived data; Mr. Maltese will provide C code for calculating variance.

5. Thoracic injury criteria development
Statistical model to predict rib fractures presented by NHTSA. Method is based on the premise that injury can be predicted on the basis of acceleration alone. Assuming that non-struck side accelerations can be predicted from struck side acceleration then one can avoid biofidelity issues associated with other measurement parameters. Injury prediction would hence be based on struck side acceleration only.

Statistical modeling used 45 cadaver tests, 2 cases of no fracture ranging to approximately 35 fractures.

Linear model suggests best predictor would be a combination of acceleration and deflection measure.

6. Future Group communications
The Chairman will set up a Web page on the IHRA Web site for document sharing.

7. Next meeting TBD after the next IHRA side meeting in early December.